LQXB06 Test Report

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Quench Training

In the first test cycle, MQXB09 quenched at 12864 A (232 T/m[1]). MQXB07 quenched at 11827 (213 T/m), then at 12538 A (226 T/m), and finally at 12812 (231 T/m).

Quench training results are compared to previous magnets in Fig. 1. Table 1 is a list of quenches executed as part of quench current studies. At the end of the test program additional quenches were done to study the ramp rated dependence of the quench current. Note that a high current trip on the leads is included for MQXB09. The magnet was quenched at high current when the heaters fired.

Summary: The requirements for acceptance are satisfied.

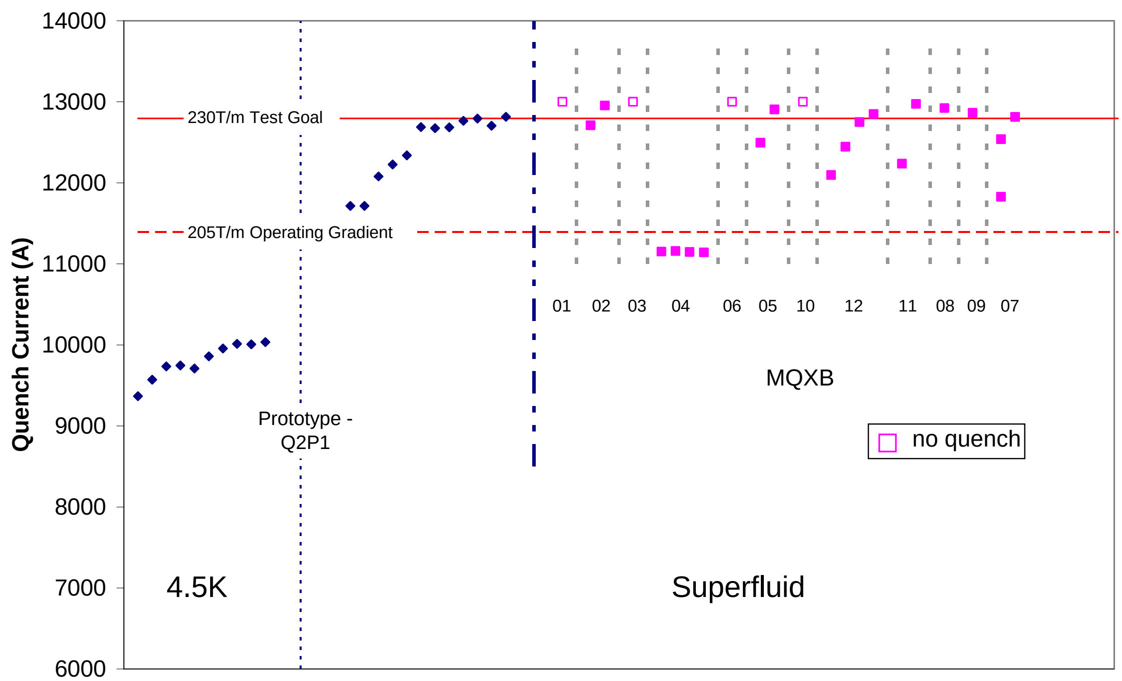

Figure 1: LQXB06 quench training. The horizontal dashed and solid lines correspond to 205 and 230 T/m field gradient respectively.

Table 1: List of quenches

date	time	test cycle	current (A)	ramp rate (A/s)	location	gradient (T/m)[2]

[1]Gradiant quoted is body gradiant based on HGQ09 body transfer function measurements.
[2] This is the equivalent body gradient based on HGQ09 measurements. The linear fit parameters to the high current transfer function are slope 0.0174 and intercept 7.34.

MQXB09						
8/16/2004	1934	1	12864	20	Q1	232
MQXB07						
8/18/2004	1446	1	11827	20	Q3	213
8/19/2004	1330	1	12538	20	Q3	226
8/19/2004	1833	1	12812	20	Q3	231
after series testing						
MQXB07						
8/24/2004	1820	1	9967	20	Q2	181[♣]
MQXB09						
8/26/2004	1510	1	11919	-	Cu-I	215
8/28/2004	1325	1	7278	300	Q1	134[♣]
8/28/2004	1355	1	8801	200	?	161[♣]
8/28/2004	1435	1	9322	160	?	170[♣]
8/28/2004	1512	1	10065	20	Q2	183[♣]
MQXB07						
8/28/2004	1805	1	5895	300	Q1	110[♣]
8/28/2004	1843	1	8226	200	?	151[♣]
8/28/2004	1920	1	9048	160	?	165[♣]

[♣]These tests were done at ~4.6K. The others are at 1.9-2.0K.

Magnetic Field Quality Measurements

Field quality measurements were made with rotating coils. Integral field measurements were made with a multi-sectioned probe of 3 sections matched to the pitch length of the inner coil with one pitch length between sections. Complete longitudinal scans were made with a probe of length 0.82 m. The program consisted of the following measurement types.

- A “DC loop” in which the magnet was ramped in a series of steps with the field characterized at DC field at each level on the up and down ramp which we use to establish both the upramp and the geometric component of the harmonic. This is done with the integral probe. No such measurement was made as they are redundant with the longitudinal scans with the short probe.
- A prototypical accelerator cycle in which the field was measured during a conditioning pre-cycle to full field followed by a ramp down, a stop at an extended injection porch with a ramp to full field afterwards. This serves to characterize the field at injection including decay and snapback effects. These are typical done with the integral probe; however in these 2 magnets we did cycles with the short probe in the magnet body and in the magnet ends.
- Continuous measurements during a series of ramps to full field and back at different ramp rates to check for eddy current effects. These are done with the integral probe. (Note that the aforementioned accelerator cycle is a 10 A/s loop; 40 and 80 A/s loops were also done.)

- A DC loop with a longitudinal scan at each stopping point. This allows body-end field separation. These scans may be integrated to provide a characterization of the entire magnet.
- A cleansing quench preceded the accelerator cycle measurement with the integral probe.

A list of the measurements made is given in Appendix A. Data is posted at the following URL.

http://wwwtsmtf.fnal.gov/~dimarco/usrAnalysisLQX/web_summaries/LQXB06/magneticMeasurements/LQXB06_mag_meas.html

Tables 2-4 summarize the field quality measurements with respect to the harmonics acceptance criteria[3] for the magnet.

Table 2: Integral Field Harmonics for LQXB06

	LQXB06		
	669 A (12.3 T/m)	11345 A (205 T/m)	Unit
TF	0.20230	0.19843	T/A
ML	11.007	11.032	m
FD	0	0	mrad
b3	-0.43	-0.46	units
b4	0.54	0.42	units
b5	0.19	-0.05	units
b6	-0.65	0.20	units
b7	0.03	0.01	units
b8	-0.01	0.00	units
b9	-0.03	-0.02	units
b10	-0.08	-0.03	units
a3	-0.05	-0.07	units
a4	0.01	0.08	units
a5	0.57	-0.01	units
a6	0.09	-0.14	units
a7	0.02	0.04	units
a8	0.01	0.00	units
a9	0.09	0.05	units
a10	-0.05	-0.03	units

[3] Acceptance criteria for harmonics are from v7 of the acceptance document. Acceptance bands are from v3.2 of the reference harmonics table. The method for calculation of integral harmonics is given in Appendix D.

Table 3: Integral Field Harmonics for MQXB07

	MQXQ07		
	669 A (12.3 T/m)	11345 A (205 T/m)	Unit
TF	n.a.	n.a.	T/A
ML	n.a.	n.a.	m
FD	0	0	mrad
b03	0.67	0.72	units
b04	0.34	0.36	units
b05	0.10	0.17	units
b06	0.24	0.24	units
b07	-0.03	-0.02	units
b08	0.00	0.00	units
b09	0.04	0.04	units
b10	-0.06	-0.02	units
a03	0.24	0.25	units
a04	-0.28	-0.29	units
a05	-0.05	-0.08	units
a06	0.07	0.09	units
a07	0.04	0.06	units
a08	-0.03	-0.02	units
a09	0.08	0.05	units
a10	0.05	0.04	units

Table 4: Integral Field Harmonics for MQXB09

	MQXB09		
	669 A (12.3 T/m)	11345 A (205 T/m)	Unit
TF	n.a.	n.a.	T/A
ML	n.a.	n.a.	m
FD	0	0	mrad
b03	-0.19	-0.19	units
b04	0.74	0.47	units
b05	0.48	0.07	units
b06	-1.55	0.15	units
b07	0.03	0.00	units
b08	-0.02	0.01	units
b09	-0.02	0.00	units
b10	-0.10	-0.04	units
a03	-0.35	-0.38	units
a04	-0.27	-0.13	units
a05	1.18	0.06	units
a06	0.25	-0.20	units
a07	0.00	0.01	units
a08	0.00	-0.01	units
a09	0.10	0.05	units
a10	-0.05	-0.02	units

Summary: Field quality is good. Most harmonics are within one sigma of the target. The higher order harmonics outside the 3 sigma limit are not likely real but due to limits in the resolution of the measurement system.

In MQXB07, there is surprisingly little hysteresis in b6. We also don’t see the hysteresis in some of the low order skew harmonics seen in past magnets. We suspect that the harmonics data being reported at 669 A is actually taken at higher current; the transfer function data is OK, however. This is currently being investigated.

Magnetic lengths are also larger that one would expect. This is also under investigation.

Magnetic Field Strength Measurements

SSW measured integral field strength with magnets powered in series is given in Table 3. The first 4 entries are taken on the up ramp and the last on the down ramp.

Table 5: Field strength vs. current.

	integral gradient transfer function (T/kA)	integral field strength(T)
Current (A)	Q2a+Q2b	Q2a+Q2b
669	202.3	135.3
5460	200.68	1095.7
11345	198.43	2251.2
11923	198.29	2364.2
5460	200.63	1095.4

Summary: The strength at 11345 A is within the acceptance band of 2254.8±5.7. (This corresponds to the band of 1127±4 T for a single cold mass.)

Alignment

LQXB06 had alignment measurements at each stage of testing at MTF. The magnet positions changed significantly during first cooldown with both Q2a weld end and Q2b far end changing vertically by about 0.4mm. There were also large changes in Q2b at the weld end horizontally by about 0.5mm and vertically by about 1mm. There was also a very large change in the roll angle of about 1mrad during initial cool-down. The cold mass position of Q2b horizontally returned close to the initial positions upon warm-up after TC1, but was vertically lower by about 0.5mm after the TC. The cold mass position of Q2a was fairly well behaved at the weld end (ending up lower after TC by about 0.4mm, but about the same horizontally), but at the far end changed by large amounts – about 0.8mm vertically and about 0.5mm horizontally (see summary plot below). Furthermore, the Q2a far end was lower warm after the TC than when it was cold. The roll remained at its cold value.

Strength measurements on the combined Q2a+Q2b were performed at 1.9K.

Adjustments of the lugs was performed after cold testing. The warm/cold changes observed upon warm-up of TC1 will be applied to the 09Sep04 measurements to generate final cold axis coordinates.

A partial list of the measurements performed is given in Table 6 with a full list in Appendix B.

Table 6: Major alignment data sets

Warm before TC1	06Aug04
Cold TC1	24Aug04
Warm after TC1	07Sep04
Warm after TC1 based Lug Adjustment	09Sep04

Data are posted at the following URL.

http://wwwtsmtf.fnal.gov/~dimarco/usrAnalysisLQX/LQXB06/SSW/LQXB06_align.html

Relative alignment of the magnet assemblies compared to AP requirements is given in Table 7. The relative alignment of the two assemblies is worse than that seen in LQXB04 and more like LQXB03. The relative roll of the correctors is ok.

A summary plot showing the changes in cold mass positions at various points in testing is shown in Fig. 2. The positions are given relative to the Cold TC1 measurements being on the average axis.

Table 7: Relative alignment of magnet assemblies (cold).

relative alignment of MQX magnets in composite Q2			relative alignment	
			x	y
Q2a/Q2b transverse alignment	500	m̄	1.37	-1.70
Q2a/Q2b relative roll	1	mrad (rms)	0.00	
Q2a/Q2b relative pitch	0.1	mrad	0.03	
Q2a/Q2b relative yaw	0.1	mrad	-0.33	
relative alignment of MCBX to Q2				
corrector displace-ment	500	m̄	n.a.	
corrector roll	5	mrad		
b1			-0.28	
a1			-3.40	

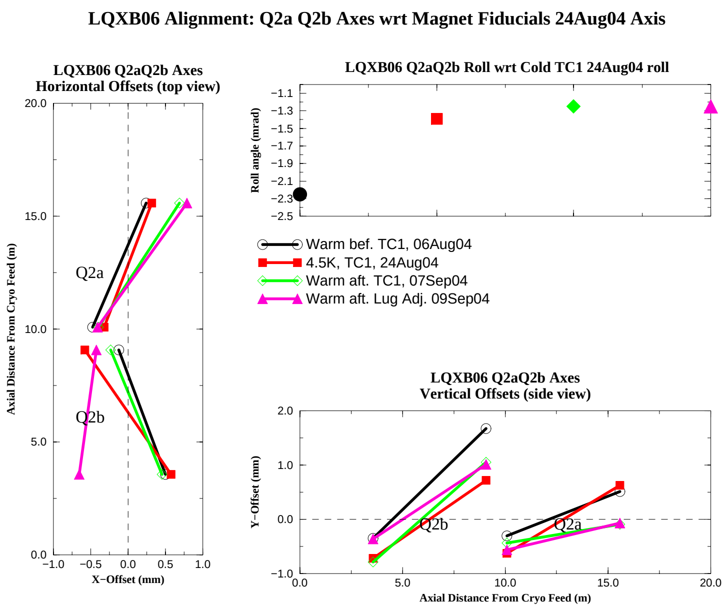

Figure 2: Alignment summary plot.

Summary: Significant changes were seen horizontally and vertically in the cold masses during cooldown and the cold masses did not return to their initial positions after the first TC. The cold alignment shows misalignment of ends wrt center of about 0.5mm horizontally and about 1mm vertically. Lug adjustment has been performed to try to reduce this.

Other tests performed

Other items of interest

During the 2nd quench of the Q2a, a heater circuit failed. (Heater 2b is open.) The failure occurred ~280 ms after heater discharge began. Investigation of the failure is documented separately.

Appendix A: List of field quality measurements

Note that a longitudinal scan of the magnetic field with a rotating coil of the warm collered coil and cold mass were made during production as part of the quality assurance program but are not listed here.

q2a	MQXB07			
size of the unpacked file	date of measurement	file name (unpacked file)	probe (IP=integral; SP=short)	remarks
12358192	Aug 20 16:31	q2a_loop40As.odb	IP	Integral probe 40 A/s loop
9534680	Aug 20 15:40	q2a_loop80As.odb	IP	Integral probe 80 A/s loop
39045351	Aug 23 08:43	q2a_accProfile.odb	IP	Integral probe Acc. Profile
39045248	Aug 23 08:42	q2a_accProfile_short.odb	SP	Short probe Acc. Profile
10659328	Aug 25 19:33	q2a_11345do.odb	SP	z-scan at 11345 A up
10659632	Aug 25 18:48	q2a_11345up.odb	SP	z-scan at 11345 A down
10659328	Aug 25 19:05	q2a_11922.odb	SP	z-scan at 11922 A
10659328	Aug 25 20:10	q2a_5459do.odb	SP	z-scan at 5459 A down
10699784	Aug 25 18:16	q2a_5459up.odb	SP	z-scan at 5459 A up
10806840	Aug 25 17:49	q2a_669up.odb	SP	z-scan at 669 A up
q2b	MQXB09			
size of the unpacked file	date of measurement	file name (unpacked file)	probe (IP=integral; SP=short)	remarks
12415936	Aug 26 14:05	q2b_loop40As.odb	IP	Integral probe 40 A/s loop
11001392	Aug 26 14:04	q2b_loop80As.odb	IP	Integral probe 80 A/s loop
17704696	Aug 26 14:04	q2b_accProfile.odb	IP	Integral probe Acc. Profile
25214312	Aug 17 21:29	q2b_accprofile_short.odb	SP	Short probe Acc. Profile
10659328	Aug 27 16:50	q2b_11345up.odb	SP	z-scan at 11345 A up
10319296	Aug 27 16:50	q2b_11922.odb	SP	z-scan at 11922 A
10659912	Aug 27 17:19	q2b_5449do.odb	SP	z-scan at 5459 A down
10659912	Aug 26 16:56	q2b_5449up.odb	SP	z-scan at 5459 A up
12992552	Aug 26 16:13	q2b_669up.odb	SP	z-scan at 669 A up

Appendix B: List of alignment measurements

LQXB06 SSW Measurements Log

```
(Column 1 is status: R indicates used directly for results; “a”
indicates ancillary)

============================================================================
Measurements in MTF
============================================================================
/usr/analysis/LQX/LQXB06/SSW/MTF
============================================================================
a   040730_07:29 warmBefTC1_29Jul04/QA/040730_07:29.checkXY
a   040730_08:11 warmBefTC1_29Jul04/QA/040730_08:11.checkXY_onAveAxis
a   040730_08:39 warmBefTC1_29Jul04/QA/040730_08:39.checkY
a   040730_08:48 warmBefTC1_29Jul04/QA/040730_08:48.checkY_5mmStep
a   040730_09:00 warmBefTC1_29Jul04/QA/040730_09:00.checkY_4mmStep_aveOnly
a   040730_09:29 warmBefTC1_29Jul04/QA/040730_09:29.checkY_3mmStep_aveOnly
a   040730_09:43 warmBefTC1_29Jul04/QA/040730_09:43.checkY_4mmStep_adj1
a   040730_15:05 warmBefTC1_29Jul04/QA/040730_15:05.checkXY_aftSurv
a   040803_12:02 warmBefTC1_29Jul04/QA/040803_12:02.checkY_aveOnly
R   040730_16:16
    warmBefTC1_29Jul04/QA/040730_16:16.checkXY_roll_sag_wireBack_repeat/040730_16:17.checkXY_roll_sag_
    wireBack
R   040730_16:16
    warmBefTC1_29Jul04/QA/040730_16:16.checkXY_roll_sag_wireBack_repeat/040730_18:22.checkXY_roll_sag_
    wireBack
R   040730_16:16 warmBefTC1_29Jul04/QA/040730_16:16.checkXY_roll_sag_wireBack_repeat
a   040803_15:52 warmBefTC1_29Jul04/QA/040803_15:52.checkXY_aveOnly
a   040803_16:13 warmBefTC1_29Jul04/QA/040803_16:13.checkXY_aveOnly_adj1
R   040803_17:06 warmBefTC1_29Jul04/QA/040803_17:06.checkXY_onAveAxis
a   040806_10:07 warmBefTC1_29Jul04/QA/040806_10:07.checkXY_onAveAxis_aftPwrRestore_aveOnly
a   040729_13:12 warmBefTC1_29Jul04/QB/040729_13:12.checkXY
a   040730_06:57 warmBefTC1_29Jul04/QB/040730_06:57.checkY
R   040729_13:36 warmBefTC1_29Jul04/QB/040729_13:36.sag_XY_roll_repeat/040729_13:36.sag_XY_roll
R   040729_13:36 warmBefTC1_29Jul04/QB/040729_13:36.sag_XY_roll_repeat/040729_16:17.sag_XY_roll
R   040729_13:36 warmBefTC1_29Jul04/QB/040729_13:36.sag_XY_roll_repeat
a   040730_07:13 warmBefTC1_29Jul04/QB/040730_07:13.checkY
a   040730_15:36 warmBefTC1_29Jul04/QB/040730_15:36.checkXY_afterSurvey
a   040803_15:36 warmBefTC1_29Jul04/QB/040803_15:36.checkXY_aveOnly
a   040803_16:26 warmBefTC1_29Jul04/QB/040803_16:26.checkXY_aveOnly_adj1
R   040803_16:38 warmBefTC1_29Jul04/QB/040803_16:38.checkXY_onAveAxis
a   040806_10:19 warmBefTC1_29Jul04/QB/040806_10:19.checkXY_onAveAxis_aftPwrRestore_aveOnly
a   040823_16:24 coldTC1_1.9K_23Aug04/QAQB/040823_16:24.test_669A
a   040823_16:36 coldTC1_1.9K_23Aug04/QAQB/040823_16:36.test_669A
a   040823_16:42 coldTC1_1.9K_23Aug04/QAQB/040823_16:42.test_669A
a   040823_16:46 coldTC1_1.9K_23Aug04/QAQB/040823_16:46.test_669A
R   040823_16:50 coldTC1_1.9K_23Aug04/QAQB/040823_16:50.str_669A_up
R   040823_17:09 coldTC1_1.9K_23Aug04/QAQB/040823_17:09.str_669A_up
R   040823_17:26 coldTC1_1.9K_23Aug04/QAQB/040823_17:26.roll_669A
R   040823_17:45 coldTC1_1.9K_23Aug04/QAQB/040823_17:45.roll_669A
R   040823_18:00 coldTC1_1.9K_23Aug04/QAQB/040823_18:00.str_5460A_up
R   040823_18:25 coldTC1_1.9K_23Aug04/QAQB/040823_18:25.str_11345A_up
a   040823_18:40 coldTC1_1.9K_23Aug04/QAQB/040823_18:40.str_11923A_up
R   040823_18:57 coldTC1_1.9K_23Aug04/QAQB/040823_18:57.str_11923A_up
R   040823_19:19 coldTC1_1.9K_23Aug04/QAQB/040823_19:19.str_5460A_dn
a   040824_11:21 coldTC1_4.5K_24Aug04/QA/040824_11:21.checkXY_aveOnly
R   040824_11:35 coldTC1_4.5K_24Aug04/QA/040824_11:35.checkXY_onAveAxis
a   040824_10:58 coldTC1_4.5K_24Aug04/QB/040824_10:58.checkXY_aveOnly
R   040824_12:11 coldTC1_4.5K_24Aug04/QB/040824_12:11.checkXY_onAveAxis
a   040824_15:39 coldTC1_4.5K_24Aug04/QB/040824_15:39.checkXY_onAveAxis_aftSurv
a   040907_12:27 warmAftTC1_07Sep04/QA/040907_12:27.checkXY_aveOnly
R   040907_12:42 warmAftTC1_07Sep04/QA/040907_12:42.checkXY_onAveAxis
R   040908_08:49 warmAftTC1_07Sep04/QA/040908_08:49.roll
R   040909_07:34 warmAftTC1_07Sep04/QA/040909_07:34.afterLugAdj1
a   040909_07:54 warmAftTC1_07Sep04/QA/040909_07:54.roll_noVac
a   040909_13:05 warmAftTC1_07Sep04/QA/040909_13:05.checkXY_onAveAxis_afterAdj
a   040907_12:02 warmAftTC1_07Sep04/QB/040907_12:02.checkXY_aveOnly
a   040907_12:16 warmAftTC1_07Sep04/QB/040907_12:16.checkXY_aveOnly
R   040907_12:59 warmAftTC1_07Sep04/QB/040907_12:59.checkXY_onAveAxis
a   040907_17:04 warmAftTC1_07Sep04/QB/040907_17:04.checkXY_aveOnly_aftSurv
a   040908_10:02 warmAftTC1_07Sep04/QB/040908_10:02.zmeas_onQBaxis
R   040907_17:16 warmAftTC1_07Sep04/QB/040907_17:16.roll_repeat/040907_17:16.roll
R   040907_17:16 warmAftTC1_07Sep04/QB/040907_17:16.roll_repeat/040907_17:46.roll
R   040907_17:16 warmAftTC1_07Sep04/QB/040907_17:16.roll_repeat/040907_18:17.roll
R   040907_17:16 warmAftTC1_07Sep04/QB/040907_17:16.roll_repeat
```

```
a   040908_10:12 warmAftTC1_07Sep04/QB/040908_10:12.zmeas_onQBaxis_15mm
a   040908_10:24 warmAftTC1_07Sep04/QB/040908_10:24.zmeas_onQBaxis_15mm
R   040908_17:46 warmAftTC1_07Sep04/QB/040908_17:46.afterAdj1
a   040908_10:34
    warmAftTC1_07Sep04/QB/040908_10:34.zmeas_onQBaxis_15mm_repeat/040908_10:34.zmeas_onQBaxis_15mm
a   040908_10:34
    warmAftTC1_07Sep04/QB/040908_10:34.zmeas_onQBaxis_15mm_repeat/040908_10:41.zmeas_onQBaxis_15mm
a   040908_10:34 warmAftTC1_07Sep04/QB/040908_10:34.zmeas_onQBaxis_15mm_repeat
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_10:49.zmeas_onQBaxis_15mm
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_10:55.zmeas_onQBaxis_15mm
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_11:02.zmeas_onQBaxis_15mm
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_11:09.zmeas_onQBaxis_15mm
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_11:15.zmeas_onQBaxis_15mm
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_11:22.zmeas_onQBaxis_15mm
R   040908_10:49
    warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat/040908_11:29.zmeas_onQBaxis_15mm
R   040908_10:49 warmAftTC1_07Sep04/QB/040908_10:49.zmeas_onQBaxis_15mm_repeat
a   040909_10:14 warmAftTC1_07Sep04/QB/040909_10:14.afterAdj1_onAveAxis
a   040909_11:37 warmAftTC1_07Sep04/QB/040909_11:37.roll_aftAdj_repeat/040909_11:37.roll_aftAdj
a   040909_11:37 warmAftTC1_07Sep04/QB/040909_11:37.roll_aftAdj_repeat/040909_12:08.roll_aftAdj
a   040909_11:37 warmAftTC1_07Sep04/QB/040909_11:37.roll_aftAdj_repeat
a   040908_12:44 warmAftTC1_07Sep04/CORRECTORS/040908_12:44.cor12
a   040908_13:02 warmAftTC1_07Sep04/CORRECTORS/040908_13:02.cor12_10mm
R   040908_17:33 warmAftTC1_07Sep04/CORRECTORS/040908_17:33.ystr
R   040908_17:39 warmAftTC1_07Sep04/CORRECTORS/040908_17:39.ystr
R   040909_08:23 warmAftTC1_07Sep04/CORRECTORS/040909_08:23.xstr12
R   040909_08:39 warmAftTC1_07Sep04/CORRECTORS/040909_08:39.xstr34
R   040909_08:43 warmAftTC1_07Sep04/CORRECTORS/040909_08:43.xstr34_repeat/040909_08:43.xstr34
R   040909_08:43 warmAftTC1_07Sep04/CORRECTORS/040909_08:43.xstr34_repeat/040909_08:47.xstr34
R   040909_08:43 warmAftTC1_07Sep04/CORRECTORS/040909_08:43.xstr34_repeat/040909_08:50.xstr34
R   040909_08:43 warmAftTC1_07Sep04/CORRECTORS/040909_08:43.xstr34_repeat/040909_08:54.xstr34
R   040909_08:43 warmAftTC1_07Sep04/CORRECTORS/040909_08:43.xstr34_repeat
R   040909_09:05 warmAftTC1_07Sep04/CORRECTORS/040909_09:05.ystr34_repeat/040909_09:05.ystr34
R   040909_09:05 warmAftTC1_07Sep04/CORRECTORS/040909_09:05.ystr34_repeat/040909_09:09.ystr34
R   040909_09:05 warmAftTC1_07Sep04/CORRECTORS/040909_09:05.ystr34_repeat/040909_09:12.ystr34
R   040909_09:05 warmAftTC1_07Sep04/CORRECTORS/040909_09:05.ystr34_repeat/040909_09:15.ystr34
R   040909_09:05 warmAftTC1_07Sep04/CORRECTORS/040909_09:05.ystr34_repeat/040909_09:19.ystr34
R   040909_09:05 warmAftTC1_07Sep04/CORRECTORS/040909_09:05.ystr34_repeat
R   040908_17:13 warmAftTC1_07Sep04/CORRECTORS/040908_17:13.ystr
R   040908_17:18 warmAftTC1_07Sep04/CORRECTORS/040908_17:18.ystr
R   040908_17:23 warmAftTC1_07Sep04/CORRECTORS/040908_17:23.ystr
a   040714_14:32 mounting_14Jul04/QB/040714_14:32.checkXY_aveOnly
a   040714_15:36 mounting_14Jul04/QB/040714_15:36.checkY_aveOnly
a   040714_15:40 mounting_14Jul04/QB/040714_15:40.checkY_aveOnly
R   040714_16:15 mounting_14Jul04/QB/040714_16:15.checkXY_onAveAxis
a   040715_10:01 mounting_14Jul04/QB/040715_10:01.checkXY_aftAdj1
R   040715_14:00 mounting_14Jul04/QB/040715_14:00.checkXY_aftAdj2
a   040715_16:02 mounting_14Jul04/QB/040715_16:02.checkXY_aftAdj2_onAvgAxis
a   040714_15:52 mounting_14Jul04/QA/040714_15:52.checkXY_aveOnly
R   040714_16:01 mounting_14Jul04/QA/040714_16:01.checkXY_onAveAxis
a   040714_16:33 mounting_14Jul04/QA/040714_16:33.checkY_onAveAxis
R   040715_09:43 mounting_14Jul04/QA/040715_09:43.checkXY_aftAdj1
R   040715_14:14 mounting_14Jul04/QA/040715_14:14.checkXY_aftAdj2
a   040715_15:48 mounting_14Jul04/QA/040715_15:48.checkXY_onAvgAxis
```

Appendix C: Q2A/Q2B->MQXB07/MQXB09

Inside LQXB04, Q2A, closest to the MTF return can, the CDF side of the building, is MQXB07. Q2B, closest to the MTF feed can, away from CDF, is MQXB09.

Appendix D: Calculation of Integral Field Harmonics

Integral field harmonics are computed from the data taken during the longitudinal scan of the magnets as described in earlier reports.

Appendix D: Calculation of Magnetic Length

There is a calibration factor applied to the rotating coil measurement of the body transfer function of 1.0094. This is based on comparison of integral probe measurements with integral SSW measurements in MQXB03, 05, 06. This value is the same as was used for LQXB03 and LQXB04.